WHAT IS CLAIMED IS:

1. An ultrasonic catheter comprising:

a body having a longitudinal axis, a circumference and a distal end region;

a first ultrasonic transducer array disposed in the distal end region of the body; and

a second ultrasonic transducer array disposed in the distal end region of the body.

2. An ultrasonic catheter according to Claim 1 wherein the first ultrasonic array is a linear phased array and the second ultrasonic array is a radial phased array.

3. An ultrasonic catheter according to Claim 2 wherein the linear phased array has an azimuth that is parallel to the longitudinal axis of the body.

4. An ultrasonic catheter according to Claim 2 wherein the linear phased array is disposed on the body proximal of the first radial phased array.

5. A catheter according to Claim 2 further comprising a second radial phased array disposed around the circumference of said distal end region of said body wherein the second radial phased array is separated from the first radial phased array along the longitudinal axis of the body.

6. A catheter according to Claim 5 wherein the linear phased array is disposed between the first and the second radial phased arrays.

7. An ultrasonic system comprising:

an ultrasonic catheter comprising a body having a longitudinal axis, a circumference and a distal end region, a first ultrasonic transducer array disposed in

the distal end region of the body, and a second ultrasonic transducer array disposed in the distal end region of the body; and

a transmit beamformer and a receive beamformer coupled to each of the first and second ultrasonic transducer arrays.

8. An ultrasonic system according to Claim 7 wherein the first array is a linear phased array and the second array is a radial phased array.

9. A catheter according to Claim 1 wherein the first array is a radial phased array disposed around only a portion of the circumference of the body.

10. A catheter according to Claim 8 wherein the second radial phased array is disposed around only a portion of the circumference of the body.

11. A catheter according to Claim 2 wherein the linear phased array has a plurality of transducer elements sequentially disposed along the longitudinal axis of the body.

12. A catheter according to Claim 2 wherein the linear phased array is curved around the distal most point of the distal end region of the body.

13. A catheter according to Claim 2 wherein the first radial phased array is disposed 360° around the circumference of the body.

14. A catheter according to Claim 8 wherein the second radial phased array is disposed 360° around the circumference of the body.

15. An ultrasonic system according to Claim 7 wherein the beamformer operates the imaging transducer array to acquire a plurality of image frames and the tracking transducer array to acquire a plurality of tracking data sets from the tracking transducer array between adjacent image frames acquired from the imaging transducer array.

16. An ultrasonic system according to Claim 7 further comprising a display system coupled to the transmit and receive beamformers to display the acquired image frames from the imaging and tracking transducer arrays.

17. An ultrasonic system according to Claim 7 further comprising a computer coupled to the transmit and receive beamformers wherein the computer is programmed to (1) acquire two-dimensional image information in an image plane generated by a first array upon excitation by the transmit beamformer, (2) acquire tracking two-dimensional data information in one tracking plane oriented at a non-zero angle with respect to the image plane with a second array upon excitation by the transmit beamformer; (3) repeat steps (1) and (2) after the catheter has been moved along a direction having a component of motion in the tracking plane (4) determine the component of motion based on a comparison of the tracking two-dimensional data information acquired in steps (2) and (3), and (5) use the component of motion determined in step (4) to register the first image information acquired in step (3) with the image information acquired in step (1).

18. An ultrasonic system according to Claim 17 wherein the first array is a linear phased array and the second array is a radial phased array.

19. An ultrasonic system according to Claim 17 wherein the first array is a radial phased array and the second array is a linear phased array.

20. A method for registering image information acquired from an interior region of a patient, said method comprising the steps of:

(a) inserting a catheter having a body having a longitudinal axis, a circumference and a distal end region, a first ultrasonic transducer array disposed in the distal region of the body and a second phased ultrasonic transducer array disposed around the circumference of the distal end region of the body into a patient to image an interior region of the patient;

(b) acquiring first two-dimensional image information in an image plane with the first ultrasonic transducer array;

(c) acquiring tracking two-dimensional data information in a tracking plane oriented at a non-zero angle with respect to the image plane with the second ultrasonic transducer array;

(d) repeating steps (b) and (c) after moving the catheter along a direction having a component of motion in the tracking plane;

(e) automatically determining the component of motion based on a comparison of the tracking two-dimensional data information acquired in steps (c) and (d); and

(f) automatically using the component of motion determined in step (e) to register the first image information acquired in step (d) with the first image information acquired in step (b).

21. The method of Claim 20 wherein step (e) comprises the step of correlating the tracking two-dimensional information acquired in steps (c) and (d).

22. The method of Claim 20 wherein the first image information comprises information selected from the group consisting of B mode information, color Doppler velocity information, color Doppler energy information, and combinations thereof.

23. The method according to Claim 20 wherein the step of moving the linear phased and radial phased arrays comprises rotating the catheter.

24. The method according to Claim 20 wherein the step (d) of moving the catheter comprises translating the catheter in a direction parallel to the longitudinal axis.

25. A method for imaging a cardiac structure, the method comprising the steps of:

(a) inserting a catheter having a body having a longitudinal axis, a circumference and a distal end region with a linear phased ultrasonic transducer array and a radial phased ultrasonic transducer array disposed thereon;

(b) acquiring image information from the linear phased ultrasonic transducer array; and

(c) acquiring image information from the radial phased ultrasonic transducer array.

26. A method according to Claim 25 further comprising the step of displaying the image information acquired in steps (b) and (c) on a display unit.

27. A method according to Claim 26 wherein the image information acquired in steps (b) and (c) are simultaneously displayed.

28. A method according to Claim 26 wherein the image information acquired in steps (b) and (c) are sequentially displayed.

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29. A method for registering image information acquired from an interior region of a patient, said method comprising the steps of:

(a) inserting an catheter having a body having a longitudinal axis, a circumference and a distal end region, a linear phased ultrasonic transducer array disposed in the distal region of the body and a first radial phased ultrasonic transducer array disposed around the circumference of the distal end region of the body into a patient to image an interior region of the patient;

(b) acquiring first two-dimensional image information in an image plane with the radial phased ultrasonic transducer array;

(c) acquiring tracking two-dimensional data information in a tracking plane oriented at a non-zero angle with respect to the image plane with the linear phased ultrasonic transducer array;

(d) repeating steps (b) and (c) after moving the catheter along a direction having a component of motion in the tracking plane;

(e) automatically determining the component of motion based on a comparison of the tracking two-dimensional data information acquired in steps (c) and (d); and

(f) automatically using the component of motion determined in step (e) to register the first image information acquired in step (d) with the first image information acquired in step (b).

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30. The method of Claim 29 wherein step (e) comprises the step of correlating the tracking two-dimensional information acquired in steps (c) and (d).

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31. The method of Claim 29 wherein the first image information comprises information selected from the group consisting of B mode information, color Doppler

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velocity information, color Doppler energy information, and combinations thereof.

Add A7

Add C1